

Remarks

This amendment is in response to the Office Action dated September 11 2002, which was paper no. 8 of the present application. Claims 11-25 have been canceled without prejudice, claim 1 amended to correct an informality, and new claims 27-35 have been added. Claims 1-11 and 27-35 are currently pending. Reexamination and reconsideration are respectfully requested.

Claims 11-25 were canceled without prejudice as non-elected claims.

Claim 1 was amended to correct an informality by inserting the word "the" between the words "than" and "insulating" in the last line of the claim. This amendment was not made in response to any rejection.

The title was objected to as not being descriptive. Applicant has amended the title in a manner similar to that suggested by the Examiner.

The drawings including Figs. 34-38 were objected to. As suggested by the Examiner, applicant proposes to insert the designation "Prior Art" to Figs. 34-38, as indicated in red on the attached sheets. Applicant will submit formal drawings after the proposed amendment has been approved by the Examiner.

Claims 1, 3 and 6-10 were rejected under 35 U.S.C. 102(a) as being unpatentable over U.S. Patent No. 5,275,965 to Manning ("Manning"). The rejection is respectfully traversed. Applicant respectfully submits that the Examiner has cited no portion of Manning that describes or suggests a method in which "the etching stopper layer is more resistant to the etching than insulating layer" as recited in claim 1. The Examiner's citations to Manning do not appear to provide any indication of a relative resistance to etching between an etching stopper layer and an insulating layer. Accordingly, for at least the above reason, applicant requests that the rejection of claim 1 and its dependent claims 3 and 6-10 be withdrawn.

Claim 2 was rejected under 35 U.S.C. 103(a) as unpatentable over Manning. The rejection is respectfully traversed. Claim 2 is patentable for at least the same reason as claim 1, from which it depends. In addition, the Examiner stated at page 5 of the Office Action that "it would have been obvious . . . to modify the process of Manning by selecting an etching ratio of the insulating layer with respect to the polycrystal silicon etching stopper layer within the ranges

as required by the claim . . ." Applicant respectfully submits that the Manning reference itself does not suggest such a modification to one of ordinary skill in the art. Manning, at Figs. 7-8 and col. 3, lines 29-30, states that "the etching of both the trench sidewall oxide and the planarized oxide does not pose a problem." Manning also states at col. 3, lines 32-37, that a sacrificial oxide 81 (Manning Fig. 8) is formed and that "the fully exposed poly tip will be consumed from both sides thereby reducing the height at which the tips protrude. The Examiner cited no portion of Manning that describes or suggests a particular-relationship between the etching rate of the poly layer 41 and the etching rate of the oxide layer 51 such as recited in claim 2. Thus, one of ordinary skill would find no motivation to modify the Manning process as suggested by the Examiner. Accordingly, for at least the above reasons, applicant respectfully requests that the rejection of claim 2 be withdrawn.

Claims 4-5 and 26 were rejected under U.S.C. 103(a) as unpatentable over Manning in view of U.S. Patent No. 6,329,266 to Hwang et al. ("Hwang"). The rejection is respectfully traversed. Applicant respectfully submits that the Examiner citation to Hwang does not overcome the deficiencies of Manning as described above for claim 1, from which claims 4-5 depend. Claim 26 can be distinguished in a similar manner.

In addition, the Examiner stated on page 5 of the Office Action that "since the use of polycrystal silicon and silicon nitride as etching stopper layers are considered equivalent techniques well known in the semiconductor art as evidenced by Manning and Hwang et al., it would have been obvious . . . to substitute one technique for the other." Applicant respectfully submits that such a basis for the combination is legally insufficient.

As noted in the MPEP at section 706.02(j), "there should be a suggestion or motivation in the art to modify the reference or to combine reference teachings." In addition, the "teachings of references can be combined only if there is some suggestion or incentive to do so." In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)). Applicant respectfully submits that the Examiner's statement regarding the use of polycrystal silicon in Manning and silicon nitride in Hwang do not, alone, establish that one of ordinary skill would

have a motivation to substitute the silicon nitride of Hwang for the polysilicon of Manning. In addition, applicant notes that Manning appears to use polysilicon as part of "gate sidewalls." The Examiner cited no portion of the art that suggests that one of ordinary skill in the art would find that the silicon nitride of Hwang could be used for forming the "gate sidewalls" of Manning. Thus, the Examiner has not established that one of ordinary skill would be motivated to make such a substitution.

Accordingly, for at least the above reasons, applicant respectfully submits that the Examiner has not established a prima facie case of obviousness and the rejection of claims 4-5 and 26 should be withdrawn.

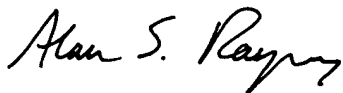
New claims 27-35 have been added. Support for dependent claim 27 may be found in the specification at page 9, lines 4-8. Support for dependent claim 28 may be found in the specification, for example, at Fig. 3. Support for independent claim 29 may be found throughout the specification and original claims and figures. Support for the "rounded corner regions" element of claim 29 may be found in the specification, for example, at page 10, lines 3-5. Support for dependent claim 30 may be found in the specification, for example, in Fig. 3. Support for dependent claim 31 may be found in the specification, for example, in Figs. 8 and 10. Support for dependent claims 32-33 may be found in the specification, for example, at page 12, lines 6-27 and in Figs. 11-13. Support for independent claim 34 may be found throughout the specification, for example, at page 8 line 28 - page 12, line 13 and in Figs. 1-11. Support for dependent claim 35 may be found, for example, in Fig. 3.

Attached hereto is a marked-up version indicating the changes to the claims made by the present amendment. The attached page is captioned "Version with markings to show changes made."

Applicant respectfully submits that claims 1-10 and 26-35 are in patentable form. Reexamination and reconsideration of the application are respectfully requested. If, for any reason, the application is not in condition for allowance, the Examiner is requested to telephone

the undersigned to discuss the steps necessary to place the application into condition for allowance.

Respectfully submitted,



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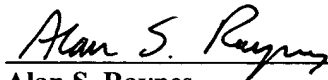
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on March 7, 2003.



Alan S. Raynes

March 7, 2003
(Date)

Version with markings to show changes made

Claim 1 was amended as follows:

1. (amended) A method for manufacturing a semiconductor device having a trench element isolation region including a trench and a trench insulating layer that fills the trench, the method comprising the steps of:

(A) forming a polishing stopper layer over a substrate, the polishing stopper layer having a predetermined pattern for a chemical-mechanical polishing;

(B) removing a part of the substrate using a mask layer including at least the polishing stopper layer as a mask to form a trench;

(C) forming a trench oxide film over a surface of the substrate that forms the trench;

(D) forming an insulating layer that fills the trench over an entire surface of the substrate;

(E) polishing the insulating layer by a chemical-mechanical polishing;

(F) removing the polishing stopper layer; and

(G) etching a part of the insulating layer to form a trench insulating layer,

wherein the method further includes the step (a) of forming an etching stopper layer for the trench oxide film over at least a portion of the trench oxide film, and wherein, in the step (G), the etching stopper layer is more resistant to the etching than the insulating layer.